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Fronts on Fallov Land and on Harbors

N. S. Tsumikova

Meteorological i Gidra. Leningrad, No 5, Leningrad, Sept-Oct  
1955, pp 38-40.

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the data for the correlation of frost to fallow land, available for a period of short-term observations, with the data for the freezing temperatures in the air (as recorded at the meteorological shelter) for the same period proved unsuccessful.

It is known that data, based on many years of observations, on the earliest and latest freezing temperatures in the air correlate well with the degree of the mean minimum temperature of air during the months of the recorded data. If we assume that this correlation exists also between the data for the earliest and the latest frosts and the mean minimum temperature at the surface of the fallow land, then the problem is reduced to the determination of the correlation between the value of the mean minimum temperature of the air and that at the surface of fallow land.

Figure 1 shows the correlation between these values obtained from the data for the mean minimum temperatures during May in various years at 18 stations. The same correlation can be obtained from the data for the mean minimum temperatures recorded over a number of years from all available observations by comparing the temperature on the surface of fallow land with the air temperature for the same general period.

Then, using the May norms for the mean minimum temperature of the air (Klimatologicheskii spravochnik [Climatological reference Book], Table IV) we took from the chart (Figure 1) the norms of the mean minimum temperature at the surface of fallow land. Next we constructed a curve based upon the data for the mean minimum temperature at the surface of fallow land and the data for the frosts at the same surface obtained from available short-term observations (Figure 2). As can be seen on this chart, the character of the correlation proved to be different for the 2 different regions of the republic (I and II).

on fallow land and that on herbage were computed by us directly on the basis of the data obtained over many years for the earliest and the latest frosts.

Thus we were able to obtain the average data for the earliest and the latest frosts at all stations of the republic and to plot the corresponding charts.

A good conception of the relation between the time of the occurrence of the earliest and the latest frosts on fallow land, on herbage, and in the air and the length of the frostless season at the abovementioned levels is given by Figure 4 which presents the data of the earliest and the latest frosts in various regions of the republic.

In the spring the difference in the date of the earliest occurrence of frost on fallow land and on herbage is expressed much more sharply than in autumn. Whereas in spring the frost on herbage ends approximately 20 days later than on fallow land, in autumn the earliest frosts occur almost simultaneously on both surfaces. The reason for this is the difference between the radiation rate in the layer of the air near the ground in spring and that in autumn, linked apparently with the difference in the moisture content of the layer of air near the ground during these seasons.

In spring the relative moisture is considerably lower than in autumn whereupon the greatest difference is observed during the morning hours, i.e., during the hours closest to the night minimum. Near the surface of the ground the difference in moisture in spring and that in autumn will undoubtedly be still greater.

The increase moisture of the layer of air nearest to the

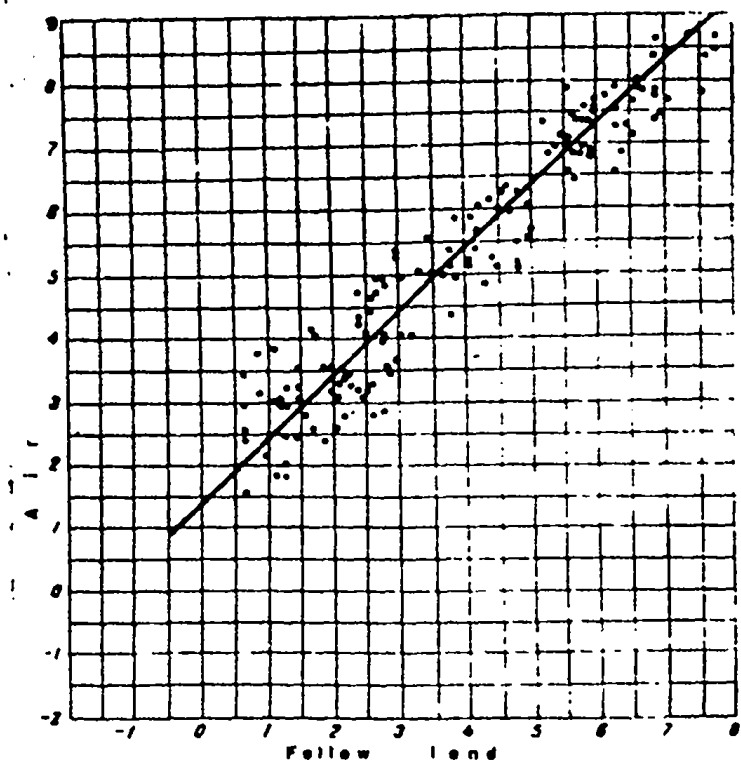


Figure 1. Correlation between monthly mean temperature for different years on the surface of fallow land and that recorded at the meteorological shelter; May.

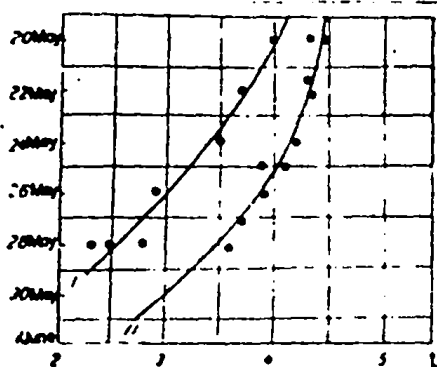


Figure 2. Correlation between the data for the latest frost and the mean minimum temperature in May at the surface of fallow land (t).

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FROSTS ON FALLOW LAND AND ON HERBAGE

Matematika i Hidrologiya  
(Meteorology and Hydrology),  
No 5, September-October, 1955,  
Leningrad, Pages 3-40

E. S. Tsenikova

An assessment of data, collected over a number of years, on the earliest and the latest frosts and on the length of the frostless period on the surface of the ground has great practical importance, especially in connection with the expansion of planting of corn which, as it is known, is injured by exposures to temperatures of minus 2° and minus 3°. Consideration of the length of the frostless season and of the probability of spring and autumn frosts is imperative for the selection of corn strains as well as for the basis upon which to determine the seeding time of the corn.

Information available in the Latvian SSR as to the dates for the earliest and the latest frosts and for the length of the frostless season do not answer the question as to the probability of freezing temperatures in the layer of air near the ground. Therefore it has become necessary to draw generalizations from available observations of short duration on the minimum temperature at the surface of the ground.

Thermometers have been used at the surface of fallow land only since 1945. Because of the great variability in the data for the earliest and latest frosts it was impossible to obtain the average data over a number of years for these characteristics by means of the usual computation. It was imperative to find an indirect method for determining the dates of the earliest frosts at the surface of fallow land.

An attempt at direct correlation of data for the earliest and

On the basis of the norms for the mean minimum temperature at the surface of fallow land, multiannual data on the termination of spring frosts at the surface of fallow land were computed from the chart (Figure 2) in accordance with the curves I and II, for all stations of the republic.

In autumn the earliest frosts at the surface of fallow land are observed in September and in the air in October. Using the norms of the September minimum temperature of the air (analogous to the above), we obtained its norms at the surface of fallow land. Then, taking these norms as a basis, we computed the corresponding data for the earliest frost at the surface of the fallow land for a period of several years for all the stations of the republic, by the above shown graphic method.

During the period from 1928 to 1945 thermometers were set up not at the surface of fallow land but on herbage or near it. This circumstance permitted us to obtain 15 to 17-year series of data for the earliest and the latest frosts at the surface of herbage at 9 points. Because of the comparatively great length of the series it became possible to obtain a direct relation between the data for the earliest frosts at the grass surface and that in the air. This is shown in Figure 3; here the average data for a number of years have been plotted for the total period of observation at the surface of herbage and at the meteorological shelter on the basis of data collected at 9 stations.

The figures for the average length of the frostless period at both levels, observed over many years, also correlate rather well. However, because of the small number of stations whose data could be used for the establishment of corresponding correlation as to this characteristic, the lengths of the frostless period

ground, by lessening the intensity of effective radiation, contributes to the lowering of the differences between the dates of the occurrence of the earliest frosts on herbage and that on fallow land. In spring on the other hand the air is relatively dry and the rougher and moreover green surface of herbage is characterized by an increased and effective radiation which causes the great difference in the dates for the latest spring frosts on fallow land and at the surface of herbage.

The above simple method for obtaining the average data over a period of many years for the earliest and the latest frosts at the surface of the ground can, in our opinion, be recommended for any region of the USSR.